LITTLE BLUE BOOK NO. 524
Edited by E. Haldeman-Julius

Death: And Its Problems

Hereward Carrington, Ph. D.

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DEATH AND ITS PROBLEMS.

CHAPTER I.

INTRODUCTORY.

Death is that last "Great Adventure" which we must all experience. A tragedy for those left behind—those who are still living—death is usually considered a tragedy for the one who has died; yet this it cannot be. Death is a solemn and terrible thing, but that is no reason why we should be afraid of it. Rather, we should regard it as the great deliverer from a life which might otherwise become unbearable; and, when this is not the case, it proves, merely, that such a death has been *premature*. As such, it is not death itself which is terrible; it is the premature termination of an otherwise useful or beautiful life.

The subject discussed in this volume—Death—is generally looked upon as something to be "tabooed" by polite society; something unpleasant, which may some day come upon us, but which we desire to think about as little as possible in the interval. There is no logical ground for this position, however, and, scientifically speaking, death may be made as fascinating a study as any other. Divested of the superstition and glamor which usually surround it, death assumes the appearance of a most interesting scientific problem, both from its physiological and its psychological aspects.

There is also another side to this question which must by no means be overlooked. I refer to the possibility of postponing death, on the one hand, and of rendering it more painless, on the other. Both of these results can only be effected by a thorough understading of the process involved; and this, in turn, can only be obtained by a close, scientific study of the problem—one that includes *all* its aspects, and treats of them impartially. In summing-up this evidence, and condensing what has been said —the speculations which have been offered during the past two hundred years—I believe that I have collected a considerable amount of interesting material; while the particular theories as to the *nature* of death will not, I hope, be without interest, and perhaps utility.

CHAPTER II.

SCIENTIFIC ASPECTS OF LIFE AND DEATH.

"The twentieth century," says Dr. Fournier D'Albe, in his interesting book, "New Light on Immortality,"—"is too busy to occupy itself much with the problems presented by death and what follows it. The man of the world makes his will, insures his life, and dismisses his own death with the scantiest forms of politeness. The churches, once chiefly interested in the ultimate fate of the soul after death, now devote the bulk of their energies to moral instruction and social amelioration. Death is all but dead as an evershadowing doom and an all-absorbing subject of controversy.

"The spectacle of 2,000,000,000 human beings rushing to their doom, with no definite knowledge of what that doom may be, and yet taking life as it comes, happily and merrily enough as a rule, seems strange and almost unaccountable. The spectacle somewhat resembles that inside a prison during the Reign of Terror, when prisoners passed their time in animated and even gay converse, not knowing who would be called out next to be trundled to the scaffold.

"Every year some 40,000,000 human corpses are consigned to the earth. A million tons of human flesh and blood and bone are discarded as of no further service to humanity, to be gradually transformed into other substances and perhaps other forms of life. Meanwhile the human race, in its myriad forms, lives and thrives . . . The individual perishes, the species survives . . ."

Death is universally recognized as the inevitable fate of every living thing—the goal towards which animate life is constantly tending—and yet, strange as it may appear, human ingenuity has not yet succeeded in formulating a definition that will adequately cover this last experience of man. We know that all things that live must grow old and die, but our theories concerning the causes that produce this phenomenon are still almost entirely of a speculative character. To say that death is "the cessation of life" is to largely avoid the question. Even Spencer's definition, in which he pronounced life to be "the continued adjustment of internal to external relations," and death, a want of correspondence between those

relations, leaves much to be desired. It presents the facts of life and death as we behold them, but it fails absolutely to trace those apparent effects to the causes, of which they are the natural manifestation. Life is *that which adjusts*, not the adjustments themselves.

Both Huxley and Cuvier have used the river whirlpool as an exact illustration of the nature of the phenomena of life and most physiologists would agree that this whirl of water is an extremely close reproduction of the natural process of assimilation and disintegration—the alternating attraction and repulsion of the ever-changing particles representing the actual condition of physical life. This process is supposed to begin at conception, and continue throughout life. It increases in activity until maturity, and then slowly decreases with advancing age. Thus far as to the matter of the physical body. The manifestation of life seems to be somehow coincident with it.

Professor W. J. V. Osterhout has recently published a remarkable book entitled "Injury, Recovery, and Death, in Relation to Conductivity and Permeability," in which he has shown that living things can be, so to say, a certain per cent dead, and a certain per cent alive; that they can be killed fifty per cent and recover, but if they are killed ninety per cent, they do not recover, etc. For these experiments, one of the common kelps on the Atlantic sea coast was used (*Laminaria agardhii*). In ordinary sea water, its life continued normally; in concentrated solutions of brine, however, the kelp slowly died; but recovered if replaced in sea water (if it had not "died" too far!). Be-

yond a certain point, recovery was impossible. This was proved by the degree of electrical resistance which was found to exist; the greater the degree of life or vitality, the greater the resistance, and *vice versa*. Life, therefore, resists the electric current, and this degree of resistance determines the degree of life present. Here, then, is a delicate test for life which will doubtless be utilized on a more extended scale in the future.

Somewhat allied to these experiments are those conducted by Professor Shiro Tashiro, of the University of Chicago, detailed by him in his book, "A Chemical Test of Life." He showed that all living things emit carbon dioxide, when stimulated—muscles, tissues, seeds, etc. So long as this gas is given off, life is present in some degree, but when it is no longer given forth, death has taken place. I have detailed these experiments more fully in my little book on popular science, published in the present series.

In this connection, we should, perhaps, call to mind the remarkable experiments of Prof. Chunder Bose, of Calcutta, in which he demonstrated that all matter is in a sense alive; that even metals become fatigued; and that plants have a definite period of life, during which they rest, sleep, react to light, drugs, stimuli, etc., in much the same manner that animals do. These reactions he recorded by means of delicate registering apparatus. I have referred to these experiments in my book on "Life," in the present series, and more fully in my "Modern Psychical Phenomena."

It is a remarkable fact that natural death,

as we understand it, does not occur among many of the lower organisms. Multiplication does not take place by sexual conjugation, but by means of splitting or "fission." Each mother cell divides across its axis, and thus gives birth to two daughter cells, which in turn divide, and so on forever. It will thus be seen that there is never any "corpse" left, in this process, and never any "death," in the sense that we understand that term. Each mother cell, it is true, perishes in giving birth to two daughter cells, but the matter of their bodies forms a continuum, and apparently continues in an unbroken line of descent, unless accidently destroyed by some external injury. Death only occurs in the higher organisms; and this is due to the fact that differentiation of their parts has taken place; they are no longer hemogeneous living things, capable of regenerating their lost parts. The price which higher organisms pay for their superior development is *death*, which is thus only introduced during the process of evolution.

Mr. Newman Smyth, in his interesting book, "The Place of Death in Evolution" has succinctly summarized the facts regarding the introduction of death into the cosmic scheme, and its significance and value with regard to life. He says:

"The first fact which has been observed is that natural death does not appear immediately at the beginning of the history of life on the earth . . . . By isolating individual *infusoria*, and thus preventing them from renewing their power of reproduction by meeting other distinctly related forms of their own species,

Maupas discovered among the descendants of the isolated individual, increasing signs of enfeebled life, senescence, and the loss of power to multiply; and finally the succession of their generations came to a complete pause, and a dead cell was left at the end of it. *At this point natural death, so far as now known, first appeared.*"

It is to be noted, however, that, experimentally, this point is seldom attained. Sedgwick and Wilson, indeed, in their "General Biology," say: "In nature, this limit is probably seldom, if ever, reached." It is interesting to note, also, that the rudiments of sex coincide largely with the beginnings of death upon our globe. H. S. Jennings, in his "Life and Death, Heredity and Evolution in Unicellular Organisms," has recently pointed out that for all practical purposes the *infusoria* are immortal, and that death only takes place higher up in the scale of life. Multicellular organisms increase by sexual conjugation and die naturally,—regardless of external injury or destruction. This is due to the complexity of their nature. When this occurs, death takes place; but it is for a purpose!

Professor Raymond Pearl, of Johns Hopkins University, has lately published a valuable book entitled "The Biology of Death," in which some interesting *data* are published. Statistics are given as to the chances and the causes of death, the duration of life, public health, etc. The most striking point made in the book, however, is undoubtedly the verification of the belief that living things are essentially immortal—even complex, multicellular organisms! Why,

then, does death take pace? Let Prof. Pearl answer in his own words:

"Life itself is inherently continuous . . . Death necessarily occurs only in such somata (bodies) of multicellular organisms as have lost, through differentiation and specialization of function, the power of reproducing each part if it, for any accidental reason, breaks down or is injured; or still possessing such power in their cells, have lost the necessary mechanism for separating a part of the soma from the rest for purposes of agamic reproduction. Somatic death results from an organic disharmony of the whole organism, initiated by the failure of some organ or part to continue in its normal, harmonious functioning in the entire differentiated and mutually dependent system. This functional breakdown of a part may be caused in a multitude of ways, from external or internal sources. It may manifest itself in a great variety of ways, both structurally and functionally. Many of these manifestations which have been regarded as causes of senescence, may more truly be considered concomitant attributes of senescence . . . The time at which natural death of the soma occurs is determined by the combined action of heredity and environment. For each organism there is a specific longevity determined by its inherited physico-chemical constitution. This specific longevity is capable of modification, within relatively narrow limits, as a result of the impact of environmental forces; the chief mode of action of the environment being in the direction of determining the rate at which the inherited endowment is used-up."

Death is now known to occupy a useful, indeed a necessary place in the process of evolution. Without death, evolution would have been impossible, for, as life becomes increasingly more organized and complex, death prevails. Death assists in the general scheme of creation; it has a great utility. Unless death had supervened, the more finely organized and fairer forms of life would not have appeared. The course of life would have been arrested. Man himself would not have appeared. The earth before us had died that we might live. We are the living children of a world that has died for us!

Death, therefore, was not introduced at the outset for the sake of annihilating life, but that it might help and hasten the progress of life, until it should reach its present point of comparative independence in our spiritual being. Even the simplest living creatures which multiply by division are potentially immortal. Viewed in this larger light, therefore, we must recognize the utility of death as a means for prolonging life; not for the purpose of destroying it. "I came not to destroy, but to fulfill."

When we come to speak of death, however, we must be very sure that we understand our terms accurately. When we cut off a chicken's head, we say that the chicken is "dead;" its conscious life is extinguished, and, if it continues to move, we do not assume, for that reason, that any "life" still remains in the chicken, but rather that "reflex action" causes these muscular phenomena. On the other hand, if we pluck a rose, it keeps its fragrance for several days, and, until that rose has withered,

and lost its freshness and beauty entirely, we do not say that the rose is "dead." In the one case, we assume that death has taken place instantaneously; in the other, that death does not take place for several days. Why is this?

The difficulty arises from this fact: There are in reality *two kinds of death.* There is the death which takes place when consciousness is extinguished. That is what we usually mean by "death." This occurs when a person is electrocuted, when a chicken has its neck wrung, or (probably) when the rose is plucked. But there is also another kind of death—the death of the cells of the body—*bodily* death. It is the so-called "somatic" life of the body, which is thus slowly extinguished. Various organs and parts of the body die at different rates, and not all at the same time. (See "Putrefaction.") We must be careful to keep these *two kinds of death* separate in the mind, in what follows.

Strictly speaking, therefore, practically the only positive fact that science can teach us concerning death is that it is the inevitable fate of all highly evolved living things. The law which stipulates that all "those who are born must die" is now as certain in its operation as the law of gravitation. At this point, however, materialistic science stops, leaving the probable fate of the individuality, or thinking part of man, an unsolved problem. As to this "soul-part" of being, in fact, science has even questioned its very existence. To the ordinary scientist, death is a door which closes upon consciousness as the breath leaves the body. If there be any existence behind that door, his experiments have thrown no light upon it, and

the man who is unwilling to accept these negative conclusions as the last word on this subject must search elsewhere for the evidence in support of the hope that is within him.

CHAPTER III.

THE MOMENT OF DEATH.

§1. THE HOUR OF DEATH.

While death may of course occur at any hour of the day or night, there is some evidence to show that most deaths take place between four and seven in the morning, when the vitality is apparently at its lowest ebb. Says the "British Medical Journal," in an article on this subject:—

"At present the evidence is somewhat conflicting. Thus, it is known that Finlayson, writing in the *Glasgow Medical Journal*, . . . found that of 13,000 deaths . . . the greatest number occurred between 5 and 7 A. M.; while Schneider, writing in *Virchow's Archiv* on deaths in Berlin, concluded that the most fatal hour was between 4 and 7 A. M. The number of deaths upon which he based his conclusions was 57,000; while Berons, arguing from the limited number of 1,000 deaths in Philadelphia, and writing in the *Philadelphia Medical Times*, concluded in favor of the hour between 6 and 7 A. M."

It therefore seems highly probable that the majority of deaths take place between 4 and 7 A. M.

§2. PAIN AT THE MOMENT OF DEATH.

Contrary to general opinion, there is seldom

any pain at the moment of death. A great deal of evidence could be adduced in support of this statement. Thus Dr. Osler has said in this connection:—

"I have careful records of about 500 death-beds, studied particularly with reference to the modes of death and the sensations of the dying. The latter alone concerns us here. . . . The great majority gave no sign one way or the other; like their birth, their death was a sleep and a forgetting."

Dr. Edward Clark says: "death is no more painful than birth." Henry Ward Beecher asserted that "there is no pain at the last moment." Dr. Mackenna ("The Adventure of Death"), Dr. Mercer ("Why do we Die?"), and many others have given similar testimony. The reason for this has been pointed out by Dr. Thomas D. Spencer, in an article in "*Popular Science Monthly*," some time ago. He says:—

"At birth the babe undergoes an ordeal that, were he conscious, would be more trying than a most painful death; yet he feels it not. . . . Pain and death seldom go together—we mean the last moments of life. Of course, death may be preceded by weeks or even months of extreme suffering, as occurs during certain incurable diseases. The blood sent to the brain is not only diminished in quantity, but is laden with carbonic-acid gas, which, acting on the nervous centers, produces a gradual benumbing of the cerebral ganglia, thereby destroying both consciousness and sensation. The patient gradually sinks into a deep stupor, the lips become purple, the face cold and livid. cold perspiration

(death damp) collects on the forehead, a film creeps over the cornea, and, with or without convulsions, the dying man sinks into his last sleep. As the power of receiving conscious impressions is gone, his death struggle must be automatic. . . . Even in those cases where the senses are retained to the last, the mind is usually calm and collected, and the body free from pain."

§3. THE CONSCIOUSNESS OF DYING.

Dr. Bailie has asserted that "all his observations of death beds inclined him to believe that nature intended that we should go out of the world as unconscious as we came into it." "In all my experience," he added, "I have not seen one instance in fifty to the contrary"

There are, however, exceptional cases, in which consciousness seems to be retained to the very last. Sir Benjamin Brodie and others have recorded such instances, and Professor Hyslop has a valuable article on the "Consciousness of Dying," in the *Journal* of the S. P. R. (June, 1898). He makes the point that, in view of this undoubted fact that the patient seems to be conscious of his own passing, and inasmuch as it would be impossible, theoretically, for consciousness ever to be conscious of its own extinction, the appearance is that consciousness is being merely *withdrawn*, and not *extinguished*. If such were the case, some form of "survival" would be indicated. This is, however, a question which is still *sub judice*, and further researches upon this subject (of death-bed psychology) are much needed.

§4. SENSATIONS WHILE FALLING.

Many instances could be cited in which an individual thought he was dying, or was about to be killed, and afterwards revived, and was then enabled to tell his inner experiences. Such cases throw an interesting sidelight upon the psychology of dying. Numerous cases are on record in which drowning persons have reviewed their past lives, "in the twinkling of an eye"; at such times, the mind works with amazing celerity. Similar experiences have been narrated by explorers who have fallen from great heights and were saved from destruction. Livingston said much the same thing when he was attacked and nearly killed by a lion. In such cases, a panorama of visions and memories flits through the mind; the whole past life seems to be reviewed. Does not this seem to indicate that, when the mind is freed from the inhibitions of the material brain, that thought can proceed with undreamed-of speed and clarity? Such cases seem to point to that interpretation, and in any event, they throw an interesting light upon death-bed experiences.

§5. MEMORY AT THE MOMENT OF DEATH.

Usually, memory is abolished, since consciousness is extinguished, and personality depends largely upon memory. In rare cases, however, as we have just seen, extraordinary powers of memory are exhibited—powers of which we have only slight indications in this life, but which are occasionally evoked under drugs, hypnotism, trance, somnambulism, etc. De Quincey (in his *Opium Eater*) and Ludlow (*The*

Hasheesh Eater) both speak of this power with astonishment and awe.

CHAPTER IV.

THE CAUSES OF DEATH.

§1. SUDDEN DEATH.

Sudden death usually results from disease, or as the result of some accident. It has been said in fact that there is no such thing as natural, sudden death. Dr. Brouardel says, in this connection:—

"Why does sudden death occur? No one dies suddenly, apart from the effects of violence so long as all the organs are sound; but there are some diseases which develop slowly and secretly, without the attention of the patient's having been called to them by any pain or by any feeling of illness, and without a physician ever having been called in, and which terminate naturally by a rapid death. . . . We will define sudden death as 'the rapid and unforeseen termination of an acute or chronic disease, which has in most cases developed in a latent manner.' . . . However carefully we may perform every autopsy, however minute our exploration of the body may be, however thorough may be our knowledge of the causes of death, we sometimes meet with cases which it is not possible to explain. The proportion is about 8 or 10 per cent."

The most common causes of sudden death are: lesions of the heart, of the arteries, cerebro-spinal system, respiratory system, digestive sys-

tem, etc. There are also deaths from burns and scalds, hæmorrhage, etc., which terminate in rapid death.

§2. MENTAL CAUSES OF DEATH.

Deaths result from mental causes more often than might be supposed. By mental causes we also mean emotional causes, for it is the emotions rather than the thoughts themselves which influence the body detrimentally or otherwise.

The pleasurable emotions have a stimulating and beneficial effect upon the body; negative and destructive thoughts weaken and devitalize it. Drs. Sweetser, Hack-Tuke and many others have cited hundred of cases of this character. Anger, fear and worry are the chief factors, while love, hope, cheer, etc., invigorate and sustain the body. Says M. Jean Finot, in his "Philosophy of Long Life";—

"The forces of the mind, well-utilized, may render us most important service from the point-of-view of the prolongation of life. . . . Let us try to live by auto-suggestion instead of dying by it. . . . Evil suggestions surround us on all sides. Persons become obsessed by the thought of old age and death. The victim feeds upon this fear, intoxicates himself with it, and dies of it!"

§3. DEATH BY POISONING.

Death as the result of poisoning may be either slow, or it may be so sudden as to be practically instantaneous. Poisons have been classed as irritant, corrosive or neurotic, according to their effect upon the system; but

some of them exert a complex action, in which their effects become blended.

Most irritant poisons belong to the mineral kingdom—both metallic and non-metallic—although the vegetable kingdom supplies a few. As Griffiths says ("Police and Crime," Vol. II. 159-60):—

"The symptoms of all kinds of poisons intermingle, and the irritants may produce the same effects as the neurotics, and some—those especially which are derived from the mineral kingdom—have a compound action."

The most important poisons are: phosphorus, arsenic (the "fool's poison") tartar emetic, mineral acids, alkalies, heavy metals (compounds of), alcohol, phenols, the analines, alkaloidal poisons, the glycosides, toxic albumens, etc. The details of these various poisons, and their effects, may be found in any medico-legal work devoted to this subject.

§4. DEATH BY FREEZING.

In cases of death by freezing, the parts whiten and become numb; intense pain may be experienced at first, but this subsides as sensation is lost; stupor gradually supervenes, followed by a deep sleep, from which the subject does not awaken. One who had nearly frozen to death, and yet lived to tell of his experiences, writes thus of his own inner or subjective sensations:

"The bitter cold does not chill and shake a person, as in damper climates. It stealthily creeps within all defences, and nips at the bone without warning. Riding along with busy thoughts, a quiet, pleasurable drowsiness takes possession of the body and mind, the senses

grow indistinct, the thoughts wander, weird fancies come trooping about with fantastic forms, and, in a confused dream of wife and home, the soul slips out into oblivion without a pang or a regret."

There are several distinguishing marks between *rigor mortis* and a body that has been frozen to death. In cadaveric rigidity the skin is soft and pliant; in the frozen body it is not. In cadaveric rigidity, when we move the limbs, there is no sound; but in frozen bodies a crackling sound is emitted.

§5. DEATH BY STARVATION.

The length of time it is possible to live without food varies greatly in warm and cold-blooded animals. Chossat found that in different warm-blooded animals death resulted when the body had lost about 40 per cent of its normal weight. He found that in animals undergoing starvation the symptoms observed during the first half or two-thirds of the period were those of calmness and quietness; the temperature then becomes elevated, restlessness and agitation prevail; and when life is terminated by the rapid fall of the temperature, stupor supervenes.

There is a great difference, however, between *starvation* and *fasting;* the latter process can often be undertaken with benefit for the cure of disease; the former is invariably detrimental; one results in cure, the other in death. I have discussed this question at considerable length, however, in my book "Vitality, Fasting and Nutrition."

In human beings, the mental attitude has a great deal to do with the result. Men have

been known to starve to death within a few days, whereas this is physiologically impossible. In such cases, it was their mental attitude which brought about their early death.

§6. DEATH BY ASPHYXIA AND DROWNING.

In asphyxia there is more or less complete loss of consciousness, because of imperfect oxidation of the blood. The symptoms may be developed rapidly or slowly. In sudden occlusion of the air passages, such as that caused by a foreign body in the larynx, or compression of the throat, as in hanging, there is usually a quiet period of from twenty to thirty seconds. after which respiratory movements both of inspiration and of expiration follow. These gradually increase in frequency and depth until, in about a minute, powerful expiratory convulsions occur; convulsive movements of inspiration are also produced, but these are usually milder in character. A period of exhaustion sets in; the respiratory movements become slower and more irregular, and gradually cease. During this period, the face has become palid, and then deeply cyanosed and flushed, the lips blue to purple, the body-temperature, at first increased, gradually diminishes. The blood pressure is at first increased, and then falls gradually to zero. Unconsciousness occurs about a minute after the occlusion, although there is great individual variation; the sphincters relax and the urine and fæces are passed. There is a loss of muscle-tone, and the reflexes are abolished. In asphyxia both lack of oxygen and increase of carbonic acid gas in the blood are important factors.

Among the most important phenomena that are to be observed are the following:—The cooling of the body is generally faster in all forms of death from asphyxia. Then, in asphyxia, the blood is always very fluid, and few clots are found in the heart or great vessels. Owing to this fluidity, hypostasis is well marked. The blood is generally very dark in color. The next point is the congested condition of the lungs. Small patches appear at the root of the lungs. Tardieu considers them distinctive of suffocation, but in this he is probably too dogmatic.

In strangulation we have the circulation to and from the brain impeded. The face is commonly pale and placid; prominent eyes are not uncommon. Protrusion of the tongue appears frequently; the hands are often clenched.

Cases of *drowning* also fall under this heading.

§7. DEATH FROM SHOCK.

This may result in one of three ways: First, by producing destructive tissue changes, when death is absolute; second, by producing sudden arrest of the respiratory and heart muscles, through excitement of the nerve centers, when death is only apparent—in other words, animation is merely suspended; or, third, by a temporary exhaustion of nerve-force—the result of a violent, sudden and excessive expenditure of it. The subject may be aroused from this syncope if efforts at resuscitation are not too long delayed. In cases of this character, the oxygen treatment is often very

efficacious. Electricity or even cold water may be applied with great success in such cases, as well as "first aid" methods.

The symptoms of shock vary greatly, according to the type of cause and the individuality of the patient. Sometimes the symptoms begin at once; under other circumstances the alleged results may be delayed for a long period. Surgical shock is, perhaps, one of the most severe. The symptoms of all forms of shock are very similar. The face usually becomes blanched and pale, the body becomes cold, and is covered with a clammy perspiration; the hands and feet usually become icy; the brain seems to be in a whirl, consciousness is lost, or much clouded, the pulse is usually quickened; the eyes sunken and listless.

§8. DEATH BY ELECTRICITY AND LIGHTNING.

While it might almost be said that the body dies first in cases of freezing, and that consciousness was only extinguished slowly towards the end, precisely the reverse of this is present in all cases of electrocution, or death by electricity. In such cases, consciousness is certainly obliterated at once, but the cell-life of the body as certainly persists for a long time after the electrocution has taken place.

The number of volts which may be passed through the human body without killing it is sometimes extraordinary. Patients have recovered from shocks which should have killed them outright. Many cases of this character are on record. Flammarion, in his book on

"Thunder and Lightning," has narrated many extraordinary freaks which lightning has played—sometimes killing the subject and sometimes not. In cases of direct contact with the lightning-flash, burns, more or less extensive and penetrating, have been noticeable; but as a rule there is nothing very remarkable about them. One of the most characteristic signs of the *post mortem* conditions in cases of death by lightning, is that when the shock has been direct and very powerful, the blood fails to coagulate after the normal fashion. (After electrocution, imperfect coagulation of blood has been noticed, giving rise to the supposition that the subject is not really dead. Such, however, does not follow, as we have seen).

§9. DEATH BY SPONTANEOUS COMBUSTION.

There is practically no belief in this at the present day, though it is admitted that the body may sometimes acquire preternatural combustibility.

CHAPTER V.

THE SIGNS OF DEATH.

Many years ago the Marquis d'Ourches offered, through the Paris Académie de Médicine, two prizes, one of twenty thousand francs, the other of five thousand francs, for some certain, simple sign of death. The Secretary, Dr. Roger, reported on the competition. One hundred and two essays were sent in; but none was deemed worthy the first prize.

The second was divided among six competitors. Five hundred francs was given M. De Cordue for his observations on the effects of the flame of a candle on the pulp of the finger. M. Larcher was rewarded for his observations on the eye after death. (As the result of examining nine hundred patients, he found the occurrence of a shadow or greyish spot, first on the outer portion of the sclerotica, and gradually involving the whole surface). M. Poncet received an honorable mention for his observations on the discoloration of the fundus of the eye; M. Molland, for his observations on cadaveric lividity; and MM. Bouchet and Linas for their observations on the temperature of the body. But nothing definite or decisive was discovered.

Passing in review the signs of death, M. Brouardel ("Death and Sudden Death") has this to say:

"The *combination* of signs of death gives us almost complete certainty of death. . . But I believe that it is right to remain in a state of philosophic doubt; we know that apparent death may last for a longer or shorter time. . . ."

What, then, are the signs of death, by which this question may be determined?

We will begin with—

§1. GENERAL SIGNS.

In death, intelligence is absent; insensibility is complete; the senses no longer function. A sclerotic speck appears on the eye; the conjunctiva assumes a brownish hue. The body is immobile; rigidity is present when *rigor*

mortis supervenes. The respiration and heart-beat are absent. Sometimes, little livid spots appear on the surface of the body. They are known as cadaveric sigillations or "lividity," and are caused by the exudation of blood into cellular tissue from the veins. The temperature gradually falls to that of the surrounding air. The skin assumes a parchment-like appearance. The skin rarely blisters—though this is not invariable. Dr. Franz Hartmann, in his manual "Burial Alive," has summarized a number of tests for death, all of which he considers unreliable. Among these might be mentioned: Immobility of a needle stuck in the pericardium: (This indicates that the heart has ceased to beat; not that the person is beyond recovery.) Emptiness of the central artery of the retina; disappearance of the papilla of the optic nerve; discoloration of the choroid and retina; interruption of the circulation of the veins in the retina; emptiness of the capillary vessels:—All open to the objection just pointed out.

Corpse-like face; discoloration of the skin; loss of transparency of the hands; emptiness of the temporal artery; white and livid coloring at the points of the fingers; relaxation of the sphincters and the pupil; glazed eyes and haziness of the cornea; insensibility of the eye to the action of a strong light; bending of the thumb towards the palm of the hand; disappearance of the elasticity of the muscles; non-coagulability of the blood; absence of a humming noise in the auscultation of the finger points—all unreliable and misleading.

Galvanism, X-rays, electric waves, etc., have been tested for a sure sign of death; even observations upon the human "aura" have been tried. These are all useful, as confirmatory signs, but none of them is certain proof, in itself.

§2. ODOR MORTIS.

It has sometimes been noticed that a peculiar and characteristic smell of death is present—a smell resembling musk. Dr. A. B. Isham called attention to this, in a paper upon the subject, published in the "Cincinnati Clinic," some years ago. He cites several cases of the kind. The phenomenon is, however, rare.

§3. RIGOR MORTIS.

Some hours after death, the body becomes rigid; this is *rigor mortis*. It usually supervenes in from three to six hours after death, though it has been noted within two hours, and as late as thirteen hours (Niederkorn). Some time later, this passes off, and the body again becomes flaccid. The period of rigidity may last from twenty-four hours to seven days (Brouardel). In cases of sun-stroke, or when the body is very fatigued, it is said that rigidity begins almost at once.

What is *rigor mortis?* To what is it due? For long, this was a moot question; but it is now generally believed that it is the first stage of putrefaction, and is due to the action of micro-organisms within the body. Certain substances are secreted, which tense the muscles. This will be more readily understood in connection with our next topic.

§4. PUTREFACTION.

This subject may appear an unpleasant one to many readers; but, rightly considered, it is not so, and affords a field for valuable scientific observations. Bear in mind the fact that putrefaction is merely the process of returning the body to the native, mineral elements of which it is composed, and there should be no objection to studying this process from the scientific point-of-view. It has nothing to do with "worms," and similar popular ideas; decomposition depends upon the action of microscopic bacteria. Remove from the mind the idea of a "corpse," and replace it by the following: Here is an organic compound; let us watch its gradual disintegration and return to mother earth.

When a body dies, three different sets of micro-organisms occupy it, one after the other. First, there are the "aerobic" organisms, so-called because they cannot live without the presence of oxygen, which they obtain from the air. Following them, there is the second set, able to live either with or without oxygen; and these M. Bordas, in his thesis on "Putrefaction," has termed "amphibious." These produce carbonic acid, also hydrogen and hydro-carbons. Lastly, there comes another set of micro-organisms, the "anaerobic," which do not live in oxygen, and which produce hydrogen, nitrogen, and more or less compound ammonias. These organisms follow one another, for the reason that each class secretes a poison in the presence of which it is unable to live. It then disappears, and is replaced

by other colonies, and so on, until the destruction of the body is complete. This explains why it is that air is necessary to render putrefaction possible; the *first* set of micro-organisms can only exist and set up their characteristic effects when there is a certain amount of free oxygen, and this they have to obtain from the atmosphere. If this is shut off, putrefaction can be prevented for a long time.

Putrefaction takes place at different rates and in different manners, according to the medium in which the body is placed. When bodies are retained in the air for some days, the body swells up from the created gas, and this has to be removed, in order to prevent tainting of the atmosphere. What is done? Holes are pricked in the bodies, and a lighted match applied to these minute orifices. Long, bluish flames start forth, like those of a blow-pipe. These remain ignited sometimes for three or four days, when the combustibility of the gas ceases. When decomposition is more advanced, the gas will not take fire in this manner. This is due to the fact that the gases created during the later stages of decomposition are not combustible; but those in the earlier stages are.

When a body decomposes under the ground, little blebs form all over the surface of the body, these are filled with a sort of serum and blood. The epidermis then separates in flakes. Gases are formed in large quantities, and when the tissues have been more or less liquefied, by the action of micro-organisms, the

flesh is ruptured, thus giving vent to these gases.

When a body decomposes in water, many interesting changes take place. Dr. Brouardel assures us that "the first green patch which appears does not show itself in the region of the caecum, as it does when the body putrefies in the open air, but over the sternum"; and he adds, "I cannot explain to you the cause of this variation." Hofman calculated that putrefaction is twice as rapid in air as in water. In water "saponification" takes place; a sort of soap is formed. The fatty matter is combined with the ammonia disengaged by decomposition. It thus forms an ammoniacal soap. If it is in water, the lime of the water drives off the ammonia, and thus forms a lime soap, and may remain unchanged for a long period.

Bodies decompose at different rates; some of them liquefy very speedily, others take months and even years to reach the same advanced stages. The bones, of course, last longest of all, gradually losing their animal matter. It is asserted that the uterus is the last organ to decompose. In adults the brain decomposes slowly, in children more quickly. The liver becomes light after death, and will float when thrown into water. This is due to the formation of gas within its structure. The lungs of an adult (and those of a child) decompose in a different manner from those of a babe who has never breathed. The eye decomposes and vanishes at the end of about

two months; the nails become loose about the twentieth day.

Putrefaction is the surest sign of death; and in all cases when there is any doubt involved, this sign should be awaited before burial takes place. Were this rule followed, there could be no question of "premature burial."

CHAPTER VI.

TRANCE, CATALEPSY, SUSPENDED ANIMATION, ETC.

The condition known to us as *Trance* is both uncertain and fluctuating. There are various types of trance—hypnotic, spontaneous, morbid, etc. Most medical writers assume that trance is dependent upon some condition of the central nervous system, but exactly in what this consists no one has yet discovered! Further, mediumistic trances are of quite a distinct type. Trances may last for hours, days or even weeks, with fluctuating consciousness. Associated with Trance is the exalted condition known as *Ecstasy*.

In *Catalepsy*, the muscles are rigid and immobile, sensibility is diminished, and consciousness more or less in abeyance.

In *Suspended Animation*, the body is usually flexible, cold, and without appreciable respiration or pulsation. Cases of this character are not uncommon, and closely resemble the hibernating animals, who sleep through the

long winter.* The Hindus are said to be enabled to induce this state at will,—so that they can be buried alive for days together, without appreciable injury. The study of all these conditions is as yet in its infancy.

Many analogies have, of course, been drawn between sleep and death. Death is often called the "Last Sleep." While there are certain external points of resemblance, there are, of course, great internal differences between the two conditions, and this must, therefore, be regarded as a poetic phantasy rather than a scientific analogy.

CHAPTER VII.

PREMATURE BURIAL.

There can be no doubt that many hundreds of persons have been buried alive, during the centuries which have preceded us. An impressive list of "Cases," and an extensive literature, exists upon this topic, which I have endeavored to summarize and portray in my book on "Death." Societies for the Prevention of Premature Burial have actually been formed in England, America, etc. Cases of trance, catalepsy, suspended animation, etc., were mistaken for death, before our more modern methods of diagnosis were introduced. Nowadays, however, this fear need no longer exist, since very exact measures for determining death have been discovered. Only careless physicians could permit a mistake of this

*Cases of "feigning death" among certain animals should also be studied in this connection.

character to be made. The process of embalming, moreover, effectually prevents the possibility of such a catastrophe—since this process alone would effectually prevent reanimation from taking place. (I have referred to this topic in our Chapter devoted to "The Fear of Death.")*

CHAPTER VIII.

BURIAL, CREMATION, MUMMIFICATION, ETC.

Despite the fact that burial is an extremely unhygienic and unwholesome custom, it is a practice that is common to all Christian coun-

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*VAMPIRES.

For several centuries there existed a belief in vampires (real ones!) in certain parts of the world, especially in Silesia, Moravia and along the frontier of Hungary. (See Bram Stoker's "Dracula.") Even to this day such stories are circulated among the people and implicitly believed by them. It is asserted that certain persons, who have died, have the power of returning from time to time (generally at night) and sucking the blood of living persons; and that in this manner they are enabled to maintain themselves in a state, if not of life, certainly one very different from death. They were supposed to maintain this sort of intra-cosmic existence so long as they could find fresh blood with which to supply themselves. These persons who were attacked would sicken and eventually die. Certain natural phenomena, plus the superstition and credulity of the natives, were doubtless the sources of such stories. I have discussed this question at some length in the Appendix of my book, "Death: Its Causes and Phenomena." The learned Augustine Calmet wrote a treatise in two volumes upon it, in the eighteenth century. Gautier has also made it the theme of his beautiful and fascinating story, "Clarimonde," published in the present series.

tries. Originating in the popular faith in the doctrine that the body should be preserved, that it might arise in its entirety at the "day of Judgment," this idea, though now seldom advanced as an excuse, is at the bottom of the antipathy that is so frequently shown in regard to cremation. Such an idea is, of course, absurd; but it is the only one which can be advanced in favor of burial, as opposed to cremation.

The burial customs of various countries would occupy a volume in themselves. Cremation is a relatively novel method of disposing of dead bodies, in the West, though it has been practised in the East for centuries. It is the cleanest, most hygienic and sensible manner of disposing of bodies—and the most esthetic, when viewed aright. The mere comparison of a handful of sacred ashes with a corpse undergoing all the various stages of putrefaction should be too obvious to need reiteration.

The process of embalming, as practised by the ancient Egyptians, is a "lost art." But we know roughly in what their procedure consisted. A deep cut was usually made beneath the ribs on the left side, and through the opening thus made the internal organs were removed, with the exception of the heart and kidneys. The brain was removed, and the cavities of the skull and trunk were washed out with palm wine, and filled with resins, cassia, and similar substances; the skull was dressed by injecting drugs of various kinds through the nostrils. The body was then

soaked in natron for seventy days. It was then removed and wrapped carefully in linen cloth, cemented by gums.

The less expensive process consisted in removing only the brains and injecting the viscera with cedar oil. When the body was soaked in natron for the same period of time (seventy days) the viscera and soft parts came away *en masse*, and only the skin and bones were left.

Embalming as carried on at the present day is quite a different process, and consists essentially in replacing the blood in the body by the embalming fluid (embalmer's solution). This hardens the tissues, and is, of course, toxic. Life would be impossible after this operation has been performed. The details of the process can be ascertained from any undertaking establishment.

Natural mummification may sometimes occur, when the air is very dry, the sun hot and the altitude high. The body then dessicates instead of decomposing in the usual manner. Mr. Post observed this in his travels through South America.

CHAPTER IX.

OLD AGE: ITS SCIENTIFIC STUDY.

This question has been exhaustively studied by scientists, of late years, both from the practical and theoretical points of view, and it will only be possible to summarize the main conclusions very briefly in the present chapter.

The process of ageing is often spoken of technically as "senescence."

There can be no doubt that the human race dies prematurely. It has been contended that we should live about five times as long as it takes us to mature. (A dog matures at two, and dies at ten, etc.) At this ratio, man *should* live to be a hundred,—since he matures at about twenty. And further, he should reach that advanced age without losing any of his faculties, and without exhibiting any of the signs of extreme old age.

Instead of this, what do we find? That the average death-rate is slightly above forty-five years—that is to say, less than one-half what it should be! And further, this forty-five years is filled with sicknesses of all kinds,—as the thousands of doctors and hundreds of hospitals amply testify. There must be *something* wrong with humanity, to render this possible! What is it? I believe that it is due chiefly to our perverted food habits, as I have endeavored to show in my books, "The Natural Food of Man," and "Vitality, Fasting and Nutrition."

The majority of cases of extreme old age which have been quoted, from time to time in the past, have proved, upon investigation, to be fictitious. Mr. William J. Tombs made a thorough investigation of such cases, and published the results in his book, "Human Longevity; its Facts and its Fictions." Here he showed that many of the oft-quoted historical cases—Henry Jenkins, Thomas Parr, the Countess of Desmond, etc.—were probably fictitious, and that there was no valid, scientific evidence in favor

of their incredible ages. A number of other cases were also examined, with similar results. The net conclusion seems to be that, while a few isolated instances may be discovered, of ages ranging from 100 to 110 years of age, practically no cases are to be found which surpass this age-limit.

The most marked feature in old age is that a fibrinous, gelatinous and earthy deposit has taken place in the system—the latter being chiefly composed of phosphate and carbonate of lime, with small quantities of sulphate of lime, magnesia, and traces of other earths. The accumulation of these solids in the system is doubtless one of the chief causes of ossification, premature old age and natural death. In the *bones* this is most noticeable. The amount of animal matter in the bones decreases with age, while the amount of mineral matter increases. This is especially marked in the long bones and the bones of the head. They thus clearly show us that a gradual process of ossification is going on throughout life.

As age advances the *muscles* diminish in bulk; the fibers become rigid and less contractile, becoming paler and even yellowish in color, and are not influenced by stimuli to the same extent as in youth. *Tendons* also become ossified, to a certain extent, while there is a diminution of the fluid in the sheaths of the tendons. The *brain* increases in size, up to about forty years of age, when it reaches its maximum weight. After this period, there is a gradual and slow diminution in weight of about one ounce in every ten years. According to Gazenvieilh, "the longitudinal diameter of the

brain of an old man, compared with that of a young man, is about six inches one line, French measure, for the former, and six inches four lines for the latter; whilst the transverse diameter is four inches ten lines in the old man, and five inches in the young man." The convolutions of the brain become less distinct and prominent.

The *dura mater* is often found apparently collapsed or corrugated. It is thickened and indurated, and ossific deposits on the arachnoid surface are very common. The membrane is sometimes found to have abnormal dryness; the *arteries* supplying the brain have, in old age, become thickened and lessened in calibre; the supply of blood thus becomes less and less, leading to the mental imbecility of the very aged. This gradual process of degeneration in the arteries, not only in the brain but throughout the body, is well recognized, and is perhaps one of the most important of all the changes that take place in old age. So important a symptom is it considered that it has given rise to the old saying that "a man is as old as his arteries." The *capillaries* also become choked or blocked and clogged-up, as the result of the earthy matter accumulated in the system.

These changes taking place in the arteries, greater pressure is thrown upon the *veins*, which dilate, their coats becoming thinner, and they even become tortuous and varicose.

The gradual process of induration and hardening going on throughout the system is noticeable also in the *heart*—giving rise to various affections known to us under a variety of symp-

toms. The *lungs* gradually lose their elasticity, and increase in density. The air-cells and bronchi become dilated—hence emphysema and chronic bronchitis are so often seen in the aged.

The *salivary glands* become hardened, and decrease in bulk. The saliva is either secreted in large quantities, so that "dribbling" takes place, or in quantities so small that the mouth is hardly moistened. These changes are probably due in part also to lack of central inhibition.

In the *stomach* the gastric juice is secreted in a diluted form, and is deficient in pepsin; moreover, the muscular walls of the stomach gradually lose their wonted contractibility; the peristaltic motion becomes weak; chyme is imperfectly manufactured, and all the processes of digestion weakly performed.

The *liver* shows the effects of old age by its imperfect bile-forming qualities. Fatty matters are not thoroughly emulsified or absorbed by the lacteals—though this may be due to an alteration in the fluid secretion in the pancreas.

In the *intestines*, the small vessels which supply the follicles and various glands become indurated, or even clogged-up, in old age. The walls of the intestines become opaque, and lose their contractibility, while the *villi* containing the lacteals undergo the same gradual alteration.

In the *eye*, in old age, there is diminished secretion of the aqueous fluid in the anterior chamber, the cornea becomes less prominent, the pupil becomes more dilated, from lessened nervous sensibility—hence distant sight and the indistinct and confused view of near objects in

the aged. Cooper states that the retina, in old age, is found "thickened, opaque, spotted, buff-colored, tough, and in some cases ossified." Quain calls attention to the fact that the color, density, and transparency of the lens presents marked differences in different periods of life. In old age it becomes flattened on both surfaces, and assumes a yellowish or amber tinge. It loses its transparency, and gradually increases in toughness and in specific gravity. Cataract is rarely found in the young, but frequently in the aged.

The *ear* is subject to the same gradual process of ossification. The cartilages of the external ear become hardened, or even ossified; the glands which secrete the ear-wax undergo the same alterations as are found in other glands. The secretion becomes less, and altered in quality. The *membrana tympani* becomes thickened and indurated; the ligaments connecting the ossicles (malus, incus and stapes) become hardened, their pliability is lessened; thus vibrations which are already imperfect, owing to the induration of the *membrana tympani*, are improperly converted by the ossicles across the cavity of the tympanum, by means of the internal ear (the structures and fluids of which have undergone the same process of consolidation), to the auditory nerve, the sensibility of which decreases with the senile changes in the brain. Hence the impaired and confused hearing so often observed in aged persons.

The whole membrane covering the *tongue* become thickened and hardened in old age; its surface becomes dry and furrowed, while the

blood-vessels supplying the papillæ are decreased in size; hence the sense of taste is diminished.

In old age, the sense of *smell* is lessened, owing to the hardening of the membranes and internal cartilages; moreover the fibers of the olfactory nerves lose their susceptibility. The sense of *touch* is also diminished; the *teeth* are lost, likewise the *hair*. The *vitality* is lessened.

The rate of *pulsation* does not vary much as age advances. From eighty to ninety it averages seventy-three to seventy-four in men, and seventy-eight to seventy-nine in women. The *respiration* of elderly persons is said to average seventeen per minute. This gradually increases, and in men, between eighty-five and ninety, it averages nineteen to twenty, and in men over ninety it averages twenty-three. In women it is a little quicker.

One of the most interesting features in advancing age is the lessening size and weight of the *cell-multiplying and blood-producing organs*—the spleen, the lymphatic glands, and Peyer's glands—coincidentally with the lessening of nutritive activity, and therefore of the demand upon the blood factors. The thymus gland fades soon (in youth); the lymphatic glands are large in childhood and youth, and are easily excited to inflame and to enlarge unduly. The mucous membrane of the stomach and intestines is usually thin and pale in the aged.

What brings about these conditions? Degenerative changes going on within the body. But what causes these degenerative changes? Many answers have been advanced by way of reply;

in fact we have here the *crux* of the problem of old age! Metchnikoff, as we know, believed that it was due to the action of phagocytes, dependent indirectly upon intestinal flora, and advocated the drinking of certain lactic-acid preparations to offset this condition. His theory is now largely given-up. Doctors Lorand, Voronoff, etc., believe that the ductless glands are responsible for old age,—the latter advocating gland-grafting as a means for restoring youth. Dr. Regnault believes that the body as a whole breaks down because one organ deteriorates first of all, and that the whole body then speedily dies. Dr. C. A. Stevens holds to the theory that we have an innate stock of vitality, at birth, which alone determines the length of life. Charles S. Minot and others believe that certain changes within the cell itself are responsible for old age and natural death. Drs. Bostwick, deLacy Evans, and others contend that old age is brought about by improper food, which poisons the body and causes the degenerative changes we see. Dr. E. Teichmann and others have advanced psychological theories, for the cause of old age and natural death. There are, in fact, innumerable theories—which may be found in the works of the authors cited. It is unnecessary for us to enter into these views here—since none of them is universally accepted today, and nearly all of them describe merely certain "phenomena" of old age,—assuming them to be the causes of that condition, whereas they may be merely the effects. Thus, assuming that certain degenerative changes take place in the cells; are these the *effects* of old age, or its causes? What

is the primal cause, and what are merely effects? This is one of the most difficult questions before the scientific world today, and is as yet unanswered in any final sense. What the prime cause may be yet awaits its solution.

Meanwhile, there can be no doubt that, from the practical point-of-view, old age can be postponed by certain dietetic and hygienic measures, which are outlined in the Chapter devoted to that question.

CHAPTER X.

HOW TO POSTPONE OLD AGE AND DEFER DEATH.

We now come to a very practical side of our problem, *viz.*, how to postpone old age, with its increasing infirmities, and also illness or premature death. Until the past two decades, the useful books upon this question could almost be counted upon one hand; now there are many scores of them giving useful advice. Certain simple rules of health may be laid down, which resolve themselves virtually into *abstemiousness* and *simplicity*. I shall summarize the rules contained in my own little book, "Death Deferred," in what follows, as well as the conclusions arrived at in my two books, "The Natural Food of Man," and "Vitality, Fasting and Nutrition." In brief, the following rules will, it is believed, be effective and practical:

1. Do not eat much, if any, meat.
2. Eat plentifully of fruits of all kinds; also salads; make them an essential part of your diet every day.
3. Avoid all bad food combinations.

4. Fast completely one day every month; and, whenever indisposed, omit a few meals, until natural hunger returns.

5. Eat but two meals a day.

6. As you grow older, eat less.

7. Masticate every mouthful of food thoroughly.

8. Drink at least four glasses of water daily; and, when feverish, ill, or indisposed double the number until you are well again.

9. Breathe pure air at all times, day and night, in the house or out of it; if indoors, see that the windows are so arranged as to give a plentiful supply of fresh air.

10. Exercise a certain amount every day, using all the muscles in turn, so that none are neglected. This should be continued until slightly fatigued.

11. Take as much sleep as you require every night; it is worth more than food or drink to you; it is the one thing you cannot omit without danger. Always take plenty of sleep!

12. Think only helpful, cheerful, optimistic thoughts; "under all circumstances keep an even mind."

13. Keep happy!

14. Bathe frequently. A cold bath is a good thing *if* you can react from it properly; it is not, if you cannot. Take a warm bath practically every day, and a Turkish bath once a month.

15. Wear loose, warm clothing, which is not air-tight; and only enough to keep the body warm when the skin is active.

16. Seek a high altitude in which to live. A cold climate is more healthful, as a rule, than a warm or hot one.

17. Determine to create your environment; and do not be dominated by it!

18. Do not fear the effects of heredity; they are generaly mythical, or at all events relatively unimportant, if a careful life be lived.

19. Never allow yourself to set a definite age limit, at which you expect to die. There is no reason why you should not live to be a hundred, or more.

20. Amusement and distraction are legitimate, and should be indulged in; cultivate a hobby; develop an interest in life; never feel that your "Life's work is finished."

These simple rules, if followed, will assure a healthy, happy life, into a mellow old age.

CHAPTER XI.

THE NATURE OF DEATH.

Death has been defined, many times, as the "cessation of life." But this is purely a negative definition unless we know what life *is*. I have attempted to answer this problem, at least in part, in my little book on "Life" (in the present series), and I shall endeavor to extend this conception to the phenomenon of death, in the following pages.

Various definitions of Death have been given in the past—all more or less unsatisfactory. Thus, Hæckel, in his "Wonders of Life," says:

"Normal death takes place in all organisms when the limit of the hereditary term of life is reached . . . As Kassowicz has pointed out, the senility of individuals consists in the inevitable increase in the decay of protoplasm,

and the metaplastic parts of the body which this produces. Each metaplasm in the body favours the inactive break-up of protoplasm, and so also the formation of new metaplasms. The death of the cell follows, because the chemical energy of the plasm gradually falls off from a certain height—the acme of life. The plasm loses more and more the power to replace, by regeneration, the losses it sustains by the vital functions."

But why is this loss of vital power? Why these chemical changes, since we have learned that the living cells are naturally immortal? These are surely mere *effects;* what are the *causes* which bring about these effects?

Dr. Brouardel, in his "Death and Sudden Death," defines death as follows:

"Death supervenes when poisons manufactured in the system, or unwholesome food that has been digested, can no longer be adequately removed by the kidneys . . . . The individual is, therefore poisoned, either by his food, or by poisons which are generated in his own body, *i. e.*, auto-intoxication."

Dr. J. H. Kellogg defines death thus:

"The cause of old age and natural death is the accumulation of waste-matters in the body."

Dr. R. T. Trail, in his "Physiology," favored the idea that that death ensues when—

"The solids are so disproportioned to the fluids that the nutritive processes can no longer be carried on."

Dr. Rosenbach (in his "Physician versus Bacteriologist") contends that:

"Death . . . . is that condition of organized matter in which all the processes of causation

have come to such a state of rest that they can no longer be set in motion, since the grouping of the atoms in the molecule has become so firm that the liberation of living force would be associated with a destruction of the molecule."

There is much to be said in favor of all these views, which may perhaps be summed-up in the two words: *poisoning* and *blockage.*

All such definitions, however, leave no clear idea in the mind as to the actual process involved; phenomena of death are described; but not initial causes. Inasmuch as the body is a machine which has somehow learned to repair itself, why should it ever wear out and die? And precisely what happens, to render natural death possible? That is the question to which we must now address ourselves, in an endeavor to discover an answer.

Let us go back to the beginning: "Death is the cessation of life." And what is life? As to the very essence of life, let us admit that we do not know in what this consists; it will be enough for our present purposes if we succeed in giving a definition of its active manifestation; the nature of its activity in this material world. So far as we know any energy, it consists in a form of activity—of motion. Life is doubtless no exception to this rule. Let us assume, then for the moment, that life is a peculiar mode of vibratory activity—playing upon and activating the living protoplasm of the body. If the manifestation of life be really a species of vibration, and

life manifests at a certain rate, and at that rate only (or within certain narrow limits), it will be seen that, in order to render impossible the manifestation of life, it would only be necessary to raise or lower the rate of vibration above or below the limits designed by Nature, as possible for the manifestation of life, in order to render this manifestation impossible. If the rate of vibration be above a certain speed, life (or its physical base or body) would be shattered, and its manifestation become impossible. On the other hand, if the rate of vibration were to fall below the minimum limit set by nature, then life would lose its hold on the organism, and drift away,—no longer able to manifest through that body. Thus, the power of life may be supposed to exercise a variable and fluctuating influence over the body; at times manifesting fully; as in intense conscious effort; at times unable to influence it as it should, owing to the poisoned and obstructed condition of the nervous system and the tissues; at times, perhaps, enabled to exercise preternatural powers and functions; at other times, maintaining only a loose and formal connection, as in sleep, or becoming severed altogether, as in death. This vital energy, this power of life, probably acts more or less indirectly upon the nervous system, through some semi-etheric intermediary. It is the power or energy which sets the molecules of the protoplasm into vital activity. A *slight* lessening of the rate of vibration would indicate a lessened amount of vitality—sluggishness, enervation, depletion, etc. On the other hand, an elevation of the rate of vibration would induce un-

due excitement, excessive stimulation, abnormal passions and emotions, feverish conditions, etc.

The condition of the body has much to do with the power of life, and the degree to which such manifestation would be rendered possible through it. If the body be poisoned, no "grip," so to say, can be obtained upon it. Can we then see how life can be prevented from manifesting through the body, and natural death take place? *It is because the rate of vibration at which life can manifest cannot be reached!* In such a body, the minimum rate of vibration at which life can become manifest to us cannot be attained. Its nervous mechanism cannot be set into motion. I should thus, therefore, define natural death, or death from old age:

IT IS THE INABILITY OF THE LIFE-FORCE TO RAISE TO THE REQUISITE RATE OF VIBRATION THE NERVOUS TISSUE UPON WHICH IT ACTS—ITS MANIFESTATION THUS BEING RENDERED IMPOSSIBLE.

Such a definition is certainly open to objections, and represents merely the point of view of the writer, and not that of the scientific world as a whole. Nevertheless, we have here, I believe, a fairly complete definition of death.

On this view, were it true, we could explain the phenomena of *sleep* and certain types of *insanity*, with some degree of success. Sleep would be that condition which enables us to regain the perfect rhythm of life—its vibrations having been shocked or jarred out of tune by the activities of the day. Sleep would therefore represent the time of rest necessary for

the re-balancing and re-adjustment of the vibrations of life.

Insanity might also be due to the excessive and continuous mal-adjustment of such vibratory activities, in those cases where no physical defect has been discovered. Rest-cures, suggestion, etc., would re-establish the proper conditions for the restoration of this activity. Certain illnesses—physical and mental—might also be readily explained on such a view, were it eventually proved to be true.

Some such view as this, it seems to me, is necessitated by the facts, and is also capable of explaining them. At all events, in view of the fact that no definition of natural death has ever been advanced, which has gained general recognition, it may be worth while to propose the above, with the hope that it may contain a germ of truth which may some day be expanded into a useful working hypothesis. We should then have a fairly clear idea of the nature of death—and incidentally of life also!

CHAPTER XII.

THE FEAR OF DEATH.

The instinct of self-preservation is strong within us; no living organism wishes to die, and yet every animate thing (and every *in*animate thing, for that matter) must eventually die individually, and (apparently) pass out of existence. The desire to prolong life is therefore natural, and a fear of death as "a leap into the unknown" seems to be more or less universal—when men and women stop to think about it at all! As a matter-of-fact, young peo-

ple rarely think of death; they live life as it comes, accepting the death of others as a matter-of-course, without stopping to think that such a lot is eventually in store for them also. This is normal and healthy; the young should *not* think of death. Adults should think about it and ponder over it occasionally; but they too should not become fascinated with the thought, or fear death in any sense. For, rightly considered, there is nothing to fear in death, as I shall presently endeavor to show.

It is a curious but a sad fact that no animal except man seems to be aware of the fate that is in store for it. As Prof. A. Dastre says, in his book on "Life and Death":

"Man, like all the higher animals, is subject to the law of 'lethality.' But while animals have no idea of death, and are not tormented by the sentiment of their inevitable end, man knows and understands his destiny, he has with the animals the instinct of self-preservation, the instinct of life, and at the same time the knowledge and the fear of death. This contradiction, this discordance, is one of the sources of our woes. . . ."

Yet there are many reasons why death should not be dreaded or even feared. We have seen that, in extreme old age, when life has not been prematurely cut short, the instinct for death more or less takes the place of the instinct for life; we then crave death as we had before craved life—just as we might crave a night's sleep after a hard day's work. Provided the life is lived out to its alloted span, one may be sure that this will be the case.

Again, we have seen that pain at the moment

of death is extremely rare—so rare that some writers have asserted it never exists. There are pains of sickness, pains of life, but never pains of death! The "death agony" is purely a play upon words. Natural death is painless.

We have also seen that there is very rarely any self-consciousness at the moment of death; Nature takes care of that. And in those rare cases in which consciousness is present, the mind is clear up to the very last. In these instances, as we have seen, there is strong evidence that the consciousness is then suddenly withdrawn, and not extinguished.

There is another fear which haunts the mind, perhaps; the fear of being buried alive. Until relatively recently, this fear might perhaps have been well grounded; there are many cases on record in which premature burials have in fact taken place. But, with modern methods of diagnosis, this possibility has been reduced almost to the vanishing point. Furthermore, the process of embalming effectually prevents anything of the kind. There need, therefore, be no fear in the mind of "waking up and finding yourself in the coffin." After embalming has taken place, anything of the kind would be an utter impossibility. This fear may, then, be dismissed altogether from the mind.

We need have no concern with our own physical body, after death. As we have seen, this gradually disintegrates and returns to the dust of which it is composed. But, on any theory, we need no longer think of it. If we are annihilated, we *cannot* think any more; if there be survival, we *need* not! The body is no longer a part of us, or we of it. If one cuts off

a bit of finger-nail, we do not think of it as oneself any longer. If a finger is lost, the same holds true; if an arm is amputated, we get along without it, and continue the same Being as before.* The same thing is true of the whole body; if we survive as individual entities, we are no more conscious of the physical body; we are no longer a part of it. On the theory of annihilation, nothing need worry us! If the practice of *cremation* were more universal, this haunting idea of the physical body after death would also be practically eliminated. Despite all its faults and follies, modern spiritualism has done one good thing—it has removed from the minds of its believers this fear of the fate of the physical body. "Why look for me in the grave, when I am here, alive and well?" is the constant refrain. True or not, this belief has served to comfort and console many.

The fear of the unknown is a great terror to many minds. We take a leap in the dark—into what? where? whither? Time alone can tell; every one must solve the great riddle for himself; but meanwhile there are a few things which might be said that will serve, perhaps, to remove some of this great fear, which so many persons experience.

Conscious Survival. In the first place, if annihilation be true, it would involve no suf-

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*There are, certainly, some odd cases in which the lost limb is apparently "felt" for some time after removal; a sort of "rapport" seems to exist between the limb and the living body. But this soon wears off, and is doubtless purely psychic. See William James' article on "The Consciousness of Lost Limbs," in the Proceedings of the (Old) Amer. S. P. R., pp. 249-58.

fering, no remorse, nothing which is to be feared. Many persons contend that this is such an "awful" thought that they cannot even contemplate it calmly; and if asked *why*, they will in nine cases out of ten, reply "Because I cannot bear the thought of never seeing those near and dear to me again!" In this, they show that they have entirely failed to grasp the true state of affairs. What they have in mind is not annihilation, but a state of full consciousness, unable to attain what it desires. They really imagine themselves conscious; and somehow unable to get at, or mentally reach, their dear ones—as though iron bars intervened—bars which existed forever, and through which the longing gaze must eternally be fixed. But this is not the case at all! This is conscious survival, not annihilation! The latter is pure nothingness; and we cannot compare it with life; because they are incapable of being compared. A better mental conception would be this: *Imagine yourself before you were born!* On trying to do so, you will probably find that a blank wall is presented to the mind—absolute nothingness. It is this which we have to imagine in the future. There is in this, it may be seen, nothing to be feared, nothing to be dreaded. We cannot dread oblivion—or we should not, for we practically experience it every night, when we go to sleep!

Eternal Rest. As to rest and peace eternal; if that is the true doctrine, there is assuredly nothing to be feared! Indeed, the only wonder is that those who hold to this view, and sincerely believe it, should be so fearful of death, and fight so hard to preserve life! There is

assuredly a paradox here, which is not without its humorous side, rightly interpreted.

Eternal Damnation. As to this doctrine, I shall not do more than say that, at the present day, such an idea is altogether given up, except by the most narrow and bigoted theologians. It is useless to discuss such a view.

Life Beyond the Grave. Finally, we reach the doctrine, now held by many, that man progresses in the "next world," according to his own merits and efforts, and in proportion to the kind of life he has lived here. According to such a theory, we progress indefinitely; fulfilling the law of evolution. Life is there very much as it is here. We grow according to our efforts. Heaven is "within ourselves," and we have only to strive in order to attain it. Assuredly this is nothing to be feared; nothing to be dreaded and avoided! It is rather what we should expect; and is little more than we experience here and now, every day of our lives.

Thus we are led to the conclusion that, no matter what view we may take of death, and of what follows upon it, we need not be alarmed; we need not regard it with horror or with fear. The Power which brought us into this Universe, and maintained us while here, whatever it may be, is quite capable of supervising a wise control in another life, if there be one, no matter what its conditions may be. The *present* constituted the *future* to those who lived before us; whilst our future will only be present to those who follow after us. In this or in any other world, life is probably continuous and progressive; and we have little to fear from the past or the present, so we have little to

fear from the future. Fear is a demon; "Resist the devil and he will flee from thee!"

With such faith, with such belief, we may then find consolation in the words of the Fabulist:

"I should like to leave life at this age, just as one leaves a banquet—thanking the host, and departing!"

CHAPTER XIII.

THEORIES OF DEATH AND IMMORTALITY.

The various theories which have been advanced by men in the past, in their attempts to solve the Great Riddle, are to be found scattered throughout the secret and profane literature of all countries. The "Riddle of the Sphynx" has been the perpetual topic for thought—the subject of innumerable religions and countless volumes. The nature of death, from the purely physiological standpoint, is a question for science to answer; the further question, what becomes of the thinking man after death? is a question for philosophy, religion, common-sense, and psychological science to answer. What have been their answers in the past?

Materialistic science says that nothing survives; the mind or "soul" of man is extinguished, at death—blown out, like the flame of a candle. Various religions have offered dogmatic solutions—all different, all said to be based upon "revelation," all equally incapable of proof. They rest upon faith alone. To the

older theological views, spiritualism and theosophy have added their own. Many of the ideas of men, throughout the ages, have been strange indeed!

Philosophy has been unable to adduce anything positive; certain *presumptions*, favorable or otherwise, have been raised, but these have remained devoid of substantial *proof*. Thus, Plato's argument for the immortality of the soul (that it was an indivisible entity, and hence necessarily immortal) has been shaken by recent researches in abnormal psychology, which have shown that the human "psyche" is essentially composite in nature. Arguments which contend that the soul is necessarily immortal because this Universe would be meaningless and absurd if it were not, amount to little; for it might be replied that the Universe *is* meaningless and absurd; where is the proof to the contrary? In the absence of facts, there is no proof! Analogies which have been advanced (the caterpillar transformed into the butterfly, Paley's watch, etc.), are all defective in the last analysis. Nor does the metaphysical proof of the reality of a superphysical world in itself demonstrate the spiritual nature of that world. Its ultimate nature is still an open question. Thus, all analogies and arguments fail to furnish us with more than a mere presumption; no positive proof is thereby secured. This proof can come only by the establishment of certain phenomena—certain *facts*. In their absence, doubt is still the logical attitude to assume. Before the doctrine of the continuance of conscious existence after death can be accepted as proved, we must demonstrate that

another world actually exists, and that in this unseen realm the disembodied spirit, by whatever name we may designate it, continues to maintain the individuality that it possessed on earth. When this result has been attained, and not until then, will man be justified in regarding his hope for immortality as anything more than the manifestation of that instinct of self-preservation which has ever been the "first law of nature."

CHAPTER XIV.

THE TESTIMONY OF SCIENCE—PSYCHICAL RESEARCH.

If, then, theology, philosophy and common-sense nave alike failed to solve the riddle of man's destiny, what has science to say upon the question? Ordinary, materialistic science has no reply; it remains for "Psychical Research" to supply any answer which may be forthcoming. By this means alone can any definite conclusion be reached—any answer of a positive character. This is not the place to attempt any detailed summary of the evidence which has been accumulated; I can merely refer the reader to my book upon psychical research, published in the present series, wherein a summary of such evidence is attempted. By this means only can any positive conclusions be reached, for, lacking evidence, we are scientifically bound to reject any form of "survival." I must, therefore, content myself by drawing the reader's attention to the evidence which

exists, and conclude by saying that, apart from this evidence, there is no valid reason to assume or believe in immortality in any form. Those who have faith may believe what they choose; but the scientist wants *facts*, and these facts can be obtained in no other manner. (See Flammarion's three volumes on "Death," recently published; and "The Encyclopaedia of Death," also in three volumes, dealing especially with this subject.)

CHAPTER XV.

CONCLUSIONS.

We have now concluded our survey of the phenomena associated with death—necessarily brief as it has been. A voluminous literature exists upon the subject, as may be seen by referring to the Bibliography contained in Prof. Pearl's "Biology of Death," or in my own book, "Death: its Causes and Phenomena." Biologists, statisticians, physicians, psychologists, physiologists, botanists, paleontologists, geologists, chemists, physicists, electricians, lawyers, clergymen, politicians—all are vitally interested in death from some particular point-of-view, for the subject touches their life and work at some specialized "angle." What other subject is so comprehensive in its scope? What other could be, indeed, seeing that death vitally affects each one of us, in that we must all die? That is the fate of every living thing—huge suns and nebulae no less than ants or atoms! All must change and pass away, giving rise to a new

order of beings, a new order of things. Death is the product of life; let us hope that life is also the resultant of death, and that an ever-finer, more splendid and highly-evolved race of beings may succeed us upon this planet; and that life, precious life, may ultimately be found deathless and eternal.